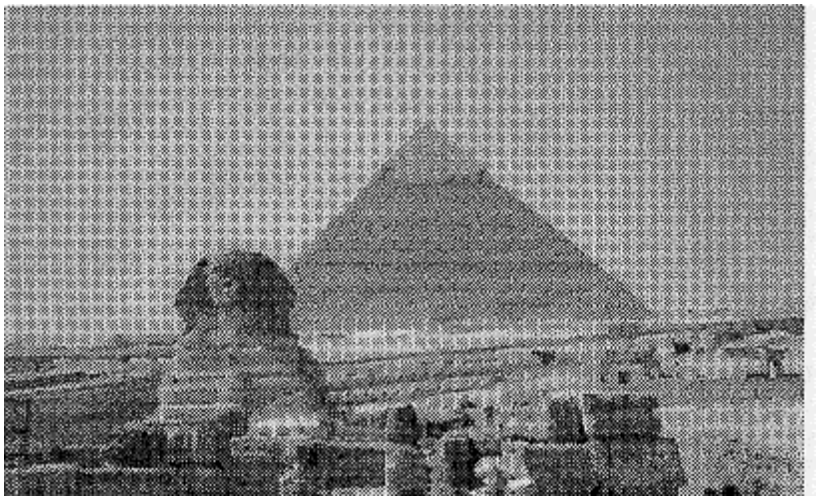
ARAT BULLETIN

Published by ATRR-PO
Fort Monmouth, NJ 07703

Volume 2, Issue 4 January 1996

ARAT Successfully Tests SIPRNET Connectivity During Exercise BRIGHT STAR 95! (See Page 1)



What's Inside:

FROM THE
ARAT BULLETIN STAFF:

1995: THE YEAR IN REVIEW

Challenge, change and progress continued to highlight Army reprogramming activities in 1995. The ATRR-PO and the ARAT-TA were intimately involved in these events.

Further improvement of the ARAT Wide Area Network (WAN) occurred in 1995. The ATRR-PO completed a major WAN operational milestone with the opening of the Rapid Reprogramming Communications Infrastructure Laboratory (R2CIL), located in the Software Engineering Center (SEC) at Fort Monmouth. The R2CIL is a secure communication facility for classified data transmission and for providing classified data services to the ARAT community. Accomplishments of the R2CIL include establishment of WAN connectivity with multiple Army, Air Force and Scientific and Technical Intelligence (S&TI) sites; implementation of a secure World Wide Web (WWW) service integrated with InteLink (S); and integration of an unclassified WWW service available through the Internet.

There were several additional areas showing change and progress. Testing and evaluation of both developmental and commercial off-the-shelf memory loader verifiers (MLVs) were completed. The ARAT-TA continued providing countless hours of quality threat support to peacetime Army Target Sensing Systems (ATSS) reprogramming efforts and crisis situations involving U.S. forces deployed throughout the world. In addition, ARAT-TA saw an expanded role develop in support of Foreign Military Sales (EMS) reprogramming support administered by the ARAT-SE, Fort Monmouth. EMS represents an important area of focus for reprogramming and will likely see much additional growth in coming years.

The ATRR-PO continued publication of the ARAT BULLETIN, a quarterly newsletter designed to provide timely, useful news and features to the Army's reprogramming community. The response to the BULLETIN has been extremely positive and now includes approximately 450 addressees. This number should continue to grow in l 996 as more organizations realize the value of this important information conduit.

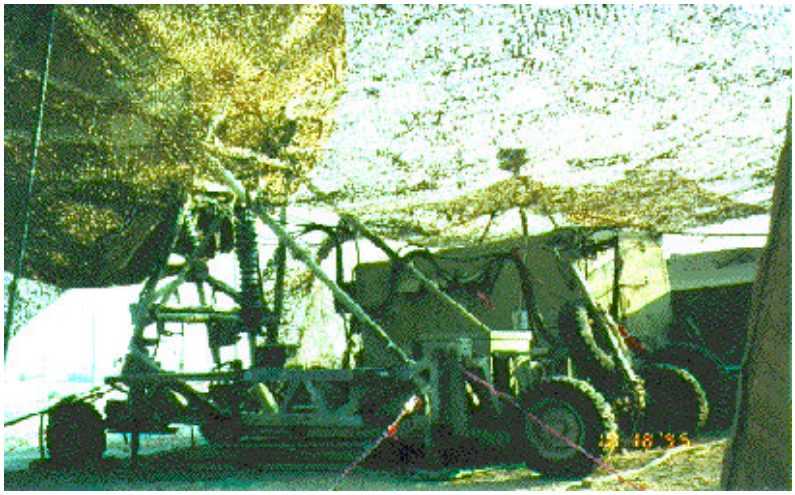
The above events are a small sampling of what occurred in 1995. All of the past year's efforts have had significant, positive impact on the future of Army reprogramming. As we head into 1996, we challenge the Army reprogramming community to continue striving to reach our goal of rapid software reprogramming support to the soldiers in the field.

THE STAFF

SIPRNET Utility Demonstrated In Egypt

"To lack intelligence is to be in the ring blindfolded."
General D.M. Shuop, USMC:
Remarks to the staff, Marine Corps Hqs, 2 Jan 1960

One of the primary objectives of the Army (Target Sensing Systems) Rapid Reprogramming Project Office (ATRR-PO) is the establishment of an infrastructure to support rapid reprogramming of Army Target Sensing Systems (ATSS). One key infrastructure development is secure site connectivity between producers and users of reprogramming data. ATRR-PO recently had a Secure Internet Protocol Routed Network (SIPRNET - formerly DISNET 1) workstation installed at Fort Monmouth, NJ. SIPRNET was used to demonstrate current rapid reprogramming capabilities during the recent Joint Chiefs of Staff (JCS) Exercise BRIGHT STAR 95, held in Egypt.



The ATRR-PO used SIPRNET to provide connectivity between the Army Reprogramming Analysis Team (ARAT) Rapid Reprogramming Communications Infrastructure Laboratory (R2CIL), located at Software Engineering Directorate (SED), Fort Monmouth, NJ and the Joint Communications Support Element (JCSE), Central Command (CENTCOM) System Control (SYSCON) deployed from MacDill AFB, Florida, to Egypt. Pre-deployment coordination with JCSE and the J-6, CENTCOM, helped obtain the communications path (to include satellite connectivity [see photos]) and projected bandwidth required for operations.

The initial ARAT exercise objective involved the transfer of threat Mission Data Sets (MDS) for the AN/APR-39A(V)1 Radar Warning Receiver from the R2CIL to aviation field units in Egypt via the SIPRNET-mediated ARAT World Wide Web (WWW). This was successfully accomplished. During the first week of the exercise, an unplanned requirement developed when a United States Marine Corps (USMC) unit requested reprogramming assistance. The ARAT-SE, working out of the R2CIL, was able to successfully organize and upload reprogramming data files via SIPRNET to the remote JCSE site location in Egypt. Files were tested for accuracy prior to transmission of the software upgrade package for an AN/UGC-144 Communications Terminal (CT) to Marine personnel. This software enhancement allowed the Marine unit to successfully upgrade their CT and maintain joint communications. This was ARAT's first on-line rapid reprogramming effort outside the Army Aviation community.

An ancillary mission was to establish a video teleconference capability (VTC) over the SIPRNET. ARAT software support engineers installed and initiated testing from CENTCOM Headquarters (HQ) in Egypt of this VTC capability, intended initially for use as an instructional tool. Available bandwidth proved restrictive but through the use of low frame rate and resolution settings, the ARAT successfully conducted VTC transmissions between deployed CENTCOM elements in Cairo West, Egypt, and CECOM SED with a resultant quality full-color image at both ends. The ATRR-PO is expanding available bandwidth and investigating additional uses of VTC technology in support of reprogramming operations.

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SIPRNET (Continued)

This success in Exercise BRIGHT STAR readily displays SIPRNET utility for Army reprogramming operations. In addition, the successful display of VTC capabilities provides additional possibilities for the Army reprogramming community. Future articles will address continued developments in these areas. Additional information can be obtained by contacting the ATRR-PO. POC is Mr. Ken Kragh, DSN: 992-6003/CML (908) 532-6003.

ATRR-PO Hosts Successful MLV Demonstrations!

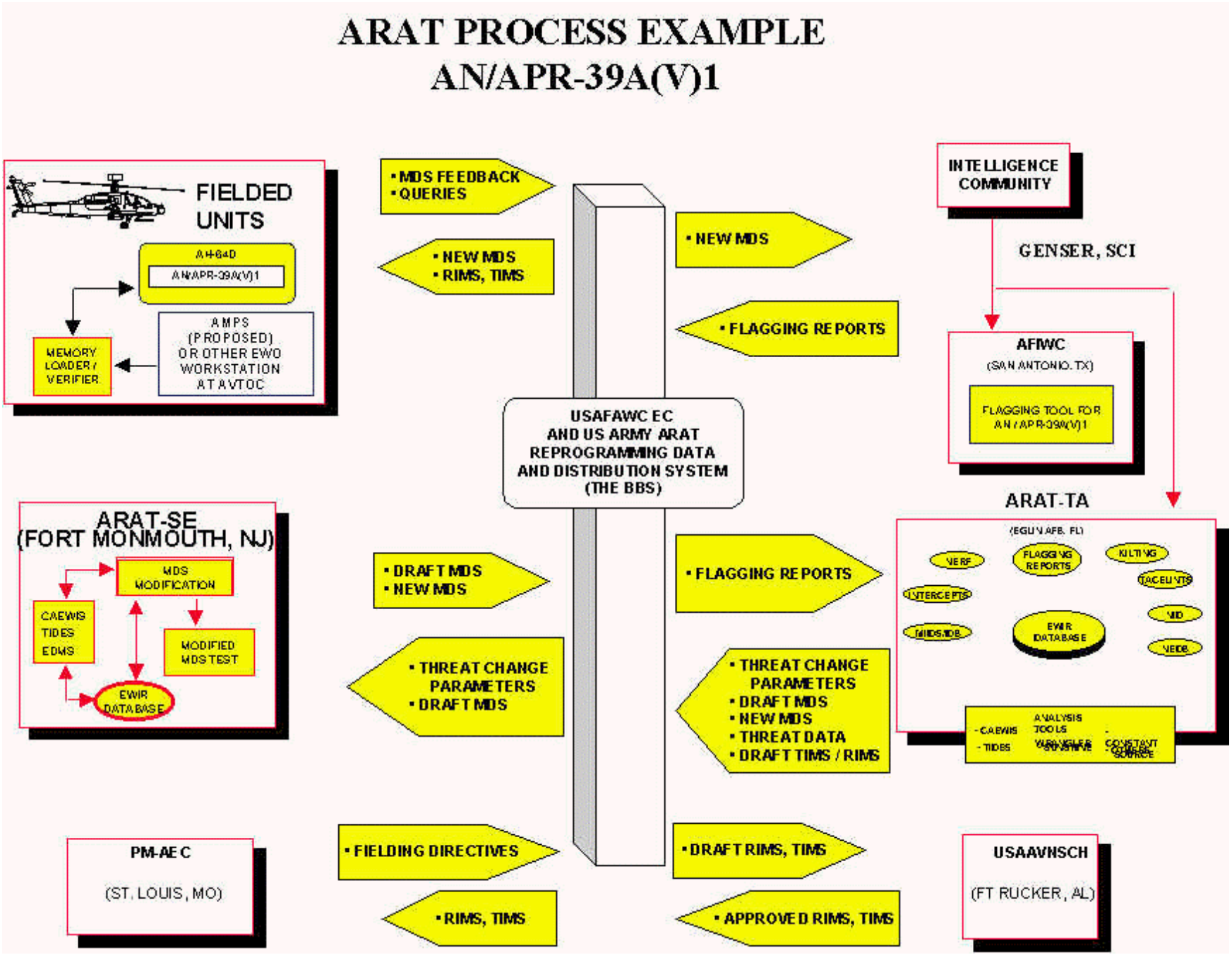
The Army (Target Sensing System) Rapid Reprogramming Project Office (ATRR-PO) hosted the Electronic Warfare Integrated Reprogramming Data Base (EWIRDB) Conference from 22-25 May at Fort Monmouth, NJ. During the conference, the Army end-to-end rapid reprogramming process was on static display to the conference attendees using the AN/APR-39A(V)1 as an example. The static display included a large poster board of the rapid reprogramming process (see figure on next page) that showed rapid reprogramming participants and their responsibilities, representative rapid reprogramming hardware (e.g., Memory Loader/ Verifier [MLV] candidates currently being tested and evaluated by ATRR-PO), and personnel to explain the process and answer questions.

In addition to the static display, over 20 MLV demonstrations were provided to conference attendees. These demonstrations used Army MLV software developed under sponsorship of the ATRR-PO (see MLVs - Part Two, this issue, for additional information) to reprogram the Mission Data Set (MDS) contained in an AN/APR-39A(V)1 (see Radar Warning Receivers - Part Two, 7/95 ARAT BULLETIN, for additional information). Hardware for the MLV demonstrations included an unclassified AN/APR-39A(V)1 "mock-up" with a reprogrammable User Data Module (UDM), candidate MLVs (including a laptop personal computer [PC] to emulate an MLV), and appropriate converters/ cables. Successful reprogramming demonstrations were provided using both a laptop PC and the Advanced Program Loading Unit (APLU), one of the MLV candidates.

As indicated in the figure, MLVs represent the last step in the Army rapid reprogramming process by loading a modified or new MDS into an Army Target Sensing System (ATSS). By successfully developing and demonstrating reprogramming software for the AN/APR-39A(V)1, ATRR-PO has shown the capability to support an important, reprogrammable ATSS. The AN/APR-39A(V)1 is used by all of the services with more than 4000 fielded or expected to be fielded by Army Aviation alone. Thus, the successful demonstrations at the EWIRDB Conference represent a significant milestone for the ATRR-PO and the Army.

Based on this success and other results from the MLV task, ATRR-PO will be providing the reprogramming software, appropriate converters/ cables, and an orientation briefing to units in the field when their AN/APR-39A(V)1 radar warning receivers are upgraded to the reprogrammable version (i.e., version 23.9 of the Operational Flight Program [OFP]). This will provide fielded units with a laptop rapid reprogramming capability for the AN/APR-39A(V)1 until MLV issues can be resolved within the Army and between the services. POCS are Mr. Sok Kim/Mr. Jon Cory, DSN: 992-1337.

ARAT PROCESS EXAMPLE
AN/APR-39A(V)1



MLVs – Memory Loader/Verifiers

(Second In a Series of Articles)

"We should provide in peace what we need in war."
Publilius Syrus: Sententiae, c. 42 B.C.

MLVs will be used to introduce software reprogramming changes (i.e., new Mission Data Sets [MDS]) into Army Target Sensing Systems (ATSS) by one of two methods: data port in-system write (ISW) and platform data bus ISW. The first method is used for ATSS with an available data port but not connected to a platform data bus. The second method is used with platforms containing one or more ATSS connected on the platform data bus.

For both of these methods, incoming software updates are loaded into the Memory Loader Verifier (MLV), with the exact procedure depending on the communications equipment used and the MLV interfaces available. Updates may be loaded through a direct serial link to a communications system, or data may be passed by traditional storage means (e.g., floppy disk or Personal Computer Memory Card International Association [PCMCIA] card).

Data Port ISW

For data port ISW, the operator takes the loaded MLV to the ATSS on a platform and connects a data cable between the MLV and ATSS data port. Since both the MLV and ATSS must be powered, additional cables may be required to supply power from the platform or a power cart. To perform a load/verify cycle, the operator can choose the system data to be uploaded from a simple menu and function keys on the MLV. The data is passed to the ATSS computer, which performs an ISW on its internal Electrically Erasable Programmable Read-Only Memory (EEPROM). When this is completed, the uploaded data is verified to match the original data on the MLV. The procedure can then be repeated for the next ATSS.

Platform Data Bus ISW

For platform data bus ISW, the operator takes the loaded MLV to the host platform and connects a data cable between the MLV and an accessible data port on the platform's data bus. Similar power considerations may require additional cables. Upon connection to a MIL-STD-1553B platform data bus, the MLV requests and accepts the role of bus controller. The operator can then select the proper data files on the MLV for uploading by using a simple menu and function key interface. The MLV communicates this data across the platform data bus to the appropriate ATSS. Once the data is communicated, a verification cycle ensures data integrity. The procedure can then be repeated for the next platform.

The first ATSS capable of using MLVs is the AN/APR-39A(V)1 radar warning receiver. Operational Flight Program (OFP) version 23.9 enables the AN/APR-39A(V)1 to be reprogrammed using an MLV and the data port ISW reprogramming method. The AN/APR-39A(V)1 data port accepts a modified RS-422 interface protocol (i.e., RS-485) which employs a variety of checksums to verify correct data transfers.

The Army (Target Sensing System) Rapid Reprogramming Project Office (ATRR-PO) sponsored an MLV task in FY95 to (1) develop Army MLV software to support the AN/APR-39A(V)1 using data port ISW reprogramming, (2) evaluate MLV candidates ability to support the AN/APR-39A(V)1 and future ATSS reprogramming needs, and (3) perform a life cycle cost analysis of MLV candidates. The Army MLV software will provide a simple menu and function key user interface linking an ATSS software module to the MLV/ATSS interface. As other ATSS are fielded with a data port or platform data bus ISW reprogrammable capability, additional ATSS software modules will be added to the Army MLV software. POCs are Mr. Sok Kim/Mr. Jon Cory, DSN: 992-1337.

Army Electronic Warfare Flagging Support Established

"It is not big armies that win battles; it is the good ones."
Maurice de Saxe: Mes Reveries, iv, 1732

The ATRR-PO recently achieved another milestone in its establishment of an end-to end reprogramming infrastructure for Army Target Sensing Systems (ATSS). ATRR-PO now has a full-time flagging engineer and technical liaison on site at the Air Force Information Warfare Center (AFIWC) at Kelly AFB, Texas. This provides the ARAT project with the capability to assist with the design and operation of conventional flagging models, including the AN/APR-39A(V)1, which is used by all Services.

The ATRR-PO previously identified a substantial set of critical tasks which could be performed most efficiently by placing an engineer at AFIWC. Through extensive coordination between the Project Office and the Air Force flagging organization (AFIWC/OSR), an agreement was reached which allows the Army to share facilities and tools necessary to carry out Army flagging and liaison functions. This agreement authorizes the Army to place one engineer on-site to accomplish these functions.

Functions:

* Day to day operation of Army Electronic Warfare (EW) conventional flagging models. This involves review/reporting of flags and support to Army Reprogramming Analysis Team-Threat Analysis (ARAT-TA) personnel on intelligence and flagging matters.

* Maintenance and update of Army EW flagging models, mission data sets (MDS) and rule sets residing in AFIWC data bases (for EW Flagging Analysis Expert System).

* Top level design and development of EW flagging models for additional Army systems.

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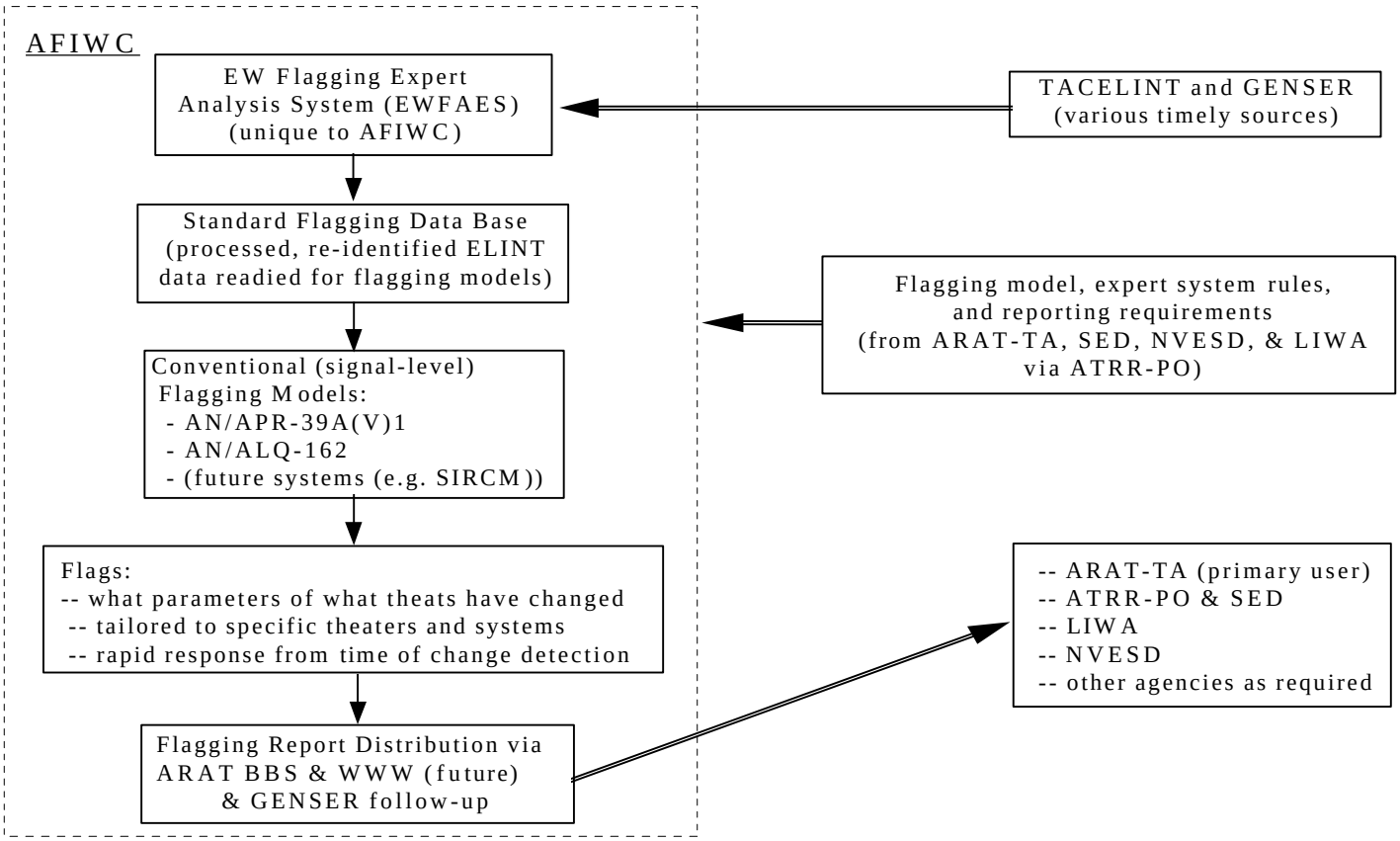

Flagging Support (Continued)

* Operation and maintenance of the ARAT-TA node (for the ARAT Bulletin Board System [BBS] and World Wide Web [WWW]/SIPRNET) at AFIWC.

* Army interface with AFIWC during Joint reprogramming exercises in which the Army participates (i.e., PROUD BYTE/ BRAVE BYTE).

* Engineering support to AFIWC/OSR flagging operations, based on case-by-case approval by the Army (Land Information Warfare Activity [LIWA] and ATRR-PO) and reciprocal agreements with AFIWC/OSR for engineering back-up of Army flagging operations.

* On-site liaison with Joint Command and Control Warfare Center (JC2WC) and the Air Intelligence Agency for ATRR-PO and LIWA, including coordination of Army "Blue" data base input requirements to AFIWC and for other data base issues.

* Status reporting to ATRR-PO on all activities.

All of the above functions contribute significantly to the ATRR-PO mission. However, the key basis for establishing an extension of ARAT at AFIWC is the leveraged use of the unique and sophisticated flagging tools and models along with the Electronic Intelligence (ELINT) and Measurements and Signal Intelligence (MASINT) front-end intelligence support associated with these tools and models. The diagram on the previous page depicts the general flow of flagging support from AFIWC.

This position is filled by Mr. Carl Brunner who has established a MILNET/Internet account at AFIWC. His Email address is carl_brunner@qm.sri.com. He is also coordinating with AFIWC/ OSR to obtain a SIPRNET connection for the ARAT WWW and BBS systems. Mr. Brunner can be contacted by commercial telephone at (210) 977-2010 or by fax at (210) 977-2145 for further information about Army flagging. ATRR-PO POCs are Mr. Sok Kim/Mr. Ken Kragh, DSN: 992-1337/6003.

The "ARAT BULLETIN"

will be published quarterly and is intended to provide the ARAT Community with current information. You are invited to submit input for improving this publication, or present articles which will be of interest to our readers. You may fax correspondence to the Editor at (908) 532-5238/DSN: 992-5238. Include your name, telephone number, and source of information.

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SIRFC: Suite of Integrated Radio Frequency Countermeasures

"Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after they occur."
Giulio Douhet: Command of the Air, 1921

The complexity and lethality of today's battlefield poses a number of threats to U. S. Army Aviation. The Army recognizes this and is moving to capitalize on the potential of U.S. technology in order to improve capabilities in such critical areas as Aircraft Survivability Equipment (ASE). ASE increases combat effectiveness of aircraft by providing active and passive detection systems which enhance aircraft and aircrew survivability in a hostile environment. One such ASE priority program currently in the Engineering and Manufacturing Development stage is the Suite of Integrated Radio Frequency Countermeasures (SIRFC).

One of the many aviation platforms that will use SIRFC includes the MH-60 BLACKHAWK.

SIRFC will eventually replace the RF ASE suite currently in use. The current RF suite includes the AN/ALQ-136(V)1/5 Pulse Radar Jammer, the AN/ALQ-162 Continuous Wave (CW) Radar Jammer, the AN/APR-39A(V)1 Pulsed Radar Warning Receiver (RWR) and the AN/APR-44 CW RWR. The original requirement for the SIRFC (known as the Advanced Threat Radar Jammer [ATRJ] in its Advanced Development Stage) was to meet or exceed the performance requirements of the current ASE suite.

SIRFC will go far beyond exceeding the requirements of its predecessor through the incorporation of sensor fusion. SIRFC will utilize data not only from its own sensors but also from other aircraft sensors. These include Global Positioning System (GPS), Radio Frequency Inferrometer (RFI), Fire Control Radar (FCR) and Suite of Infrared Countermeasures (SIRCM). In addition, SIRFC will use data from the Electronic Order of Battle (EOB) to make the best decision as to which threat systems are illuminating the aircraft and how to best respond. Utilizing this information will greatly reduce the number of ambiguities seen in analyzing the signatures of threat radar systems.

The design of SIRFC is tailored to meet demands of the rapidly changing modern battle- field. The Operational Flight Program (OFP), the Mission Data Set (MDS), and the EOB will all be contained on a rapidly reprogrammable Personal Computer Memory Card International

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SIRFC (Continued)

Association (PCMCIA) card which is inserted into the SIRFC Line Replaceable Unit (LRU). Options available for reprogramming the PCMCIA card include:

* Removing the PCMCIA card and reprogramming via a PCMCIA card slot in a Personal Computer (PC)

* Reprogramming via the MIL-STD-1553 avionics bus, or

* Reprogramming via the MIL-STD-1553 ASE bus.

The exact method of reprogramming for SIRFC is still under development and may be somewhat different on an aircraft to aircraft basis (since some aircraft are bussed while others are non-bussed). The Aviation Mission Planning System (AMPS) will play a key part in the reprogramming of SIRFC. In the short term (SIRFC Operational Test [OT]), it is expected that MDS and EOB files will be sent electronically to AMPS which will in turn be loaded onto the PCMCIA card utilizing a PCMCIA slot within AMPS. In the long term, it is desired that the SIRFC EOB information be updated in the field on a mission-by-mission basis to take advantage of sensor fusion processing.

Since AMPS is expected to utilize EOB data for its mission planning function, a natural extension would be to automatically incorporate this EOB data into the SIRFC User Data Module (UDM). Although this sounds simple, many details have to be worked out to ensure the data is in a compatible format and contains the right information for SIRFC. As far as MDS updates, it is expected that updates would be accomplished in a similar fashion to that used during the SIRFC OT, by electronic transfer of MDS files to AMPS and downloading via an AMPS PCMCIA slot.

It is not anticipated that fielded units will have the capability to alter any MDS data because any modifications can cause drastic changes in system performance. MDS changes must be carefully designed and validated before fielding. The biggest potential problem to be encountered with this methodology is the possible existence of incompatible configurations as OFPs and MDSs are updated in the future. However, with careful planning, fielded units will have the best MDS support possible. POCs are Mr. Joe Ingrao/Mr. Jeff Boldridge, DSN: 992-8224.

The AH-64A APACHE, another aviation platform which will be supported by SIRFC.